May 7, 1963 T. FOSEID 3,088,129

CONVERTIBLE SOFA BEDS

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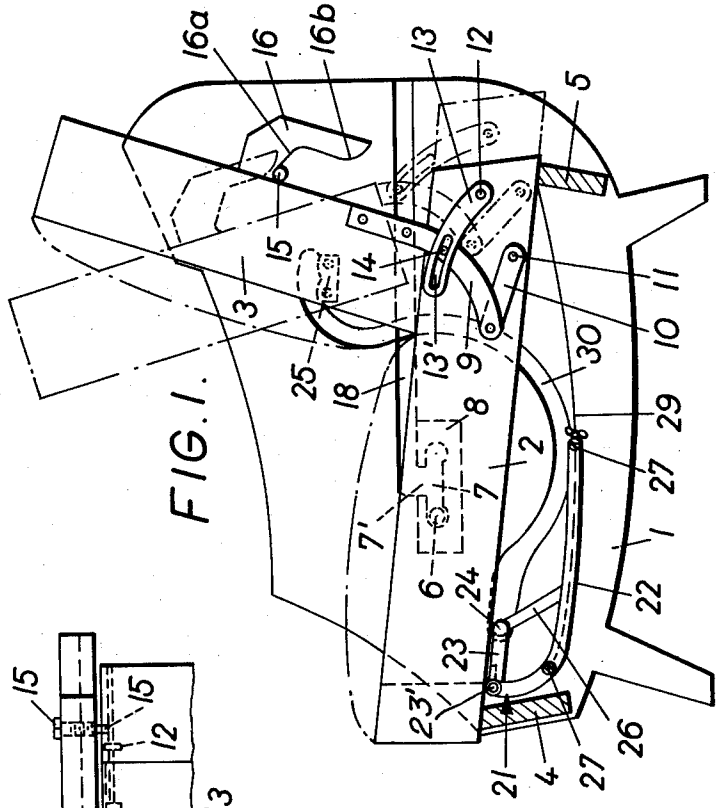

FIG. 1.

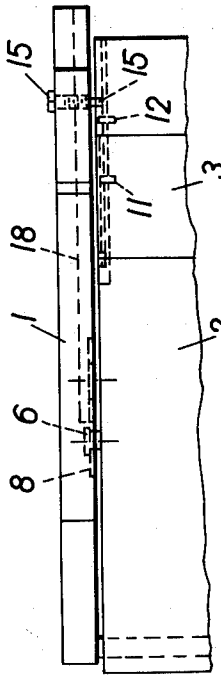

FIG. 3.

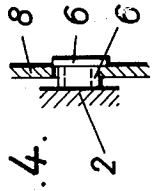

FIG. 4.

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FIG. 2

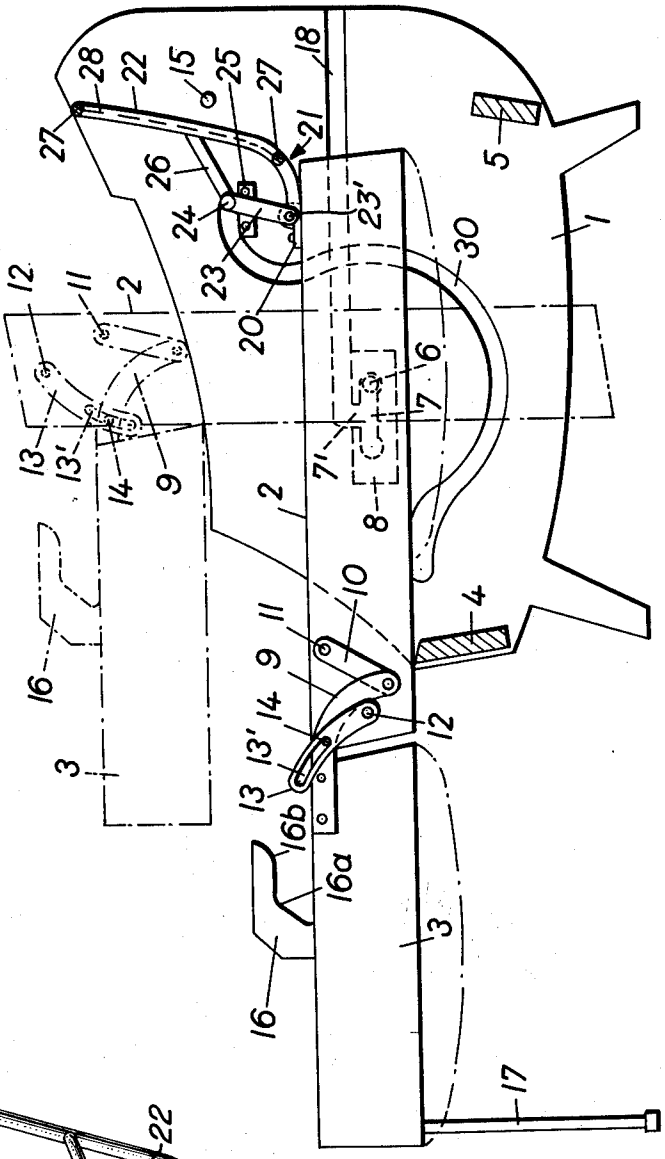
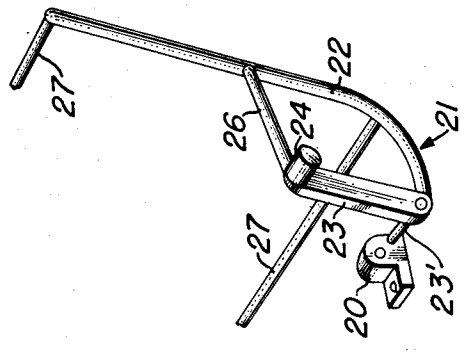


FIG. 5.



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3,088,129

CONVERTIBLE SOFA BEDS

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5 Claims. (Cl. 5—24)

This invention relates to convertible sofa-beds and more particularly sofa beds of the kind in which the back rest and the seat are pivotally interconnected and the seat is supported for rotation about a longitudinal axis so that the back rest can be rotated forwardly while at the same time rotating the seat, the seat and back rest finally forming a level surface adapted to form a bed surface.

Known sofa-beds of the above mentioned kind suffer from the disadvantage that since the seat has to be rotated in a forwardly direction, to convert the sofa into a bed, it must be free from the front support of the frame of the sofa-bed. Consequently, the front of the seat is unsupported and when the seat is loaded there is a tendency for it to rotate unless releasable locking means is provided for holding the seat and the back rest fixedly in position.

It is an object of the present invention to avoid the above disadvantage and to support the seat on the front support of the frame of the sofa-bed in the sofa position.

It is another object of the invention to have the seat move rearwardly out of contact with the front support of the frame during initial pivoting of the back rest to enable free uninterrupted pivotal movement of the seat.

According to the invention there is provided a convertible sofa-bed in which the longitudinal pivotal axis of the seat is movably mounted to permit the seat to move in the plane of its original position so as to bring the front of the seat out of and into engagement with the front support of the frame of the sofa.

By the above it is possible for the seat, when the back rest is initially moved forwardly, to be initially moved rearwardly of the frame so that the forward edge thereof is free from the front support of the frame whereafter the seat may be rotated freely about the said longitudinal axis.

It is a feature of the invention that the frame of the back rest is preferably provided with cam means co-operating with studs mounted in the side frame so that the back rest, after an initial forward pivotal movement acts as a lever and causes the seat to move rearwardly by a predetermined distance to free it from the front support of the frame prior to rotation of the seat.

According to a further feature of the invention, it is preferable that the ends of the seat frame are connected to the adjacent side frames by a pivot and slot connection allowing a limited movement of the seat in its own plane with respect to the side frames. The pivots may be mounted on the seat frame so that they project into slotshaped plates on said side frames, or the pivots may be arranged on the side frames with the slotted plates on the seat frame.

In sofas of the above mentioned kind it is of importance that in use the rear edge of the seat frame in the bed forming position does not tend to pivot downwardly.

Consequently, a still further feature of the invention is a locking device by means of which the seat frame can be locked in the bed position. Preferably the locking device is connected with a member which obstructs the surface of the bed or mattress until such member has been swung out of the way, the arrangement being such that this swinging movement automatically moves the locking device into its locking position.

For this purpose the lower side of the seat frame, adjacent its front edge and at each end thereof, has an angle lever rotatably connected thereto which lever carries a locking pin co-operating with a mounting secured to the adjacent side frame, said angle levers being rigidly interconnected by a frame-like structure which extends over the bed surface of the seat frame with the latter in the bed position.

One preferred embodiment of the invention by way of example only will now be described with reference to the accompanying drawing, in which:

FIGURE 1 is a side view of the sofa-bed in its sofa forming position with one side frame removed and with the position of the members in the first phase of the conversion movement shown in dotted lines.

FIGURE 2 is a similar view with the sofa-bed in its bed position and with the seat and back rest shown approximately at the midway position of the conversion movement in dotted lines.

FIGURE 3 is a plan view of one side frame of the sofa, and

FIGURE 4 shows a sectional detail view.

FIGURE 5 shows a perspective view of a portion of the structure of the sofa-bed.

In the drawings **1** indicates the side frame of the sofa-bed, **2** the seat frame and **3** the back frame resting with its lower side on the seat frame as shown. The seat frame is supported by a longitudinal front frame member **4** and a corresponding rear frame member **5**.

At each end of the seat frame is secured a stud **6** projecting into a slot **7** in a plate **8** secured to the adjacent side frame. Each of the studs **6** is provided with a rotatable sleeve **6'** (FIG. 4) and a head having a diameter somewhat greater than that of the sleeve, so that the stud can roll by means of the sleeve **6'** in the slot but is prevented from being withdrawn from the slot.

In the sofa forming position of the seat and the back rest the studs **6** are positioned at the front end of the slots **7** which slots extend approximately horizontally and towards the back. In order to prevent undesired displacement or rolling of the studs in the slots, the ends of said slots are provided with a small bearing depression shaped to receive the diameter of the sleeve **6'** as best seen in FIG. 2.

On each end of the back frame **3** at the rear side thereof is secured a downwardly and forwardly curved arm **9** the lower free end of which is attached by means of a link **10** to pivot **11** on the seat frame. On the seat frame there is a pivot **12** on which a link **13** is mounted the free end portion of which link has a longitudinal slot **13'** receiving a pin **14** secured to the arm **9**.

The back frame is held in position by means of bolts **15** threaded through each of the side frames **1** (as shown in FIG. 3) so that they can be screwed outwards until the ends thereof are flush with the inner side of the side frame for a purpose to be described below.

A rearwardly projecting cam member **16** is arranged at each end of the back frame to co-operate with the adjacent bolt **15**.

When it is desired to open the bed, from the position shown in full lines in FIG. 1, in which the studs **6** are at the front end of the slots **7** and the bolts **15** engage the back frame **3** below the cam members **16** this is easily done by rocking the upper side edge of the back frame forwardly, which can be effected without any great resistance, since during this moment the inclined cam paths **16*a*** slide on the bolts **15** while the back frame pivots about the links **10**. When the back frame occupies an approximately vertical position, the cam path **16*b*** approximately parallel therewith co-operates with the bolts **15** which constitute pivots about which the back

frame can swing. Thus the back frame serves as a lever by means of which the seat frame 2 can be moved backwards so that the studs 6 are moved from the front ends to the rear ends of the slots 7.

In this manner the seat frame 2 is moved rearwardly to such an extent that the front side thereof is disposed rearwardly of the front supporting frame member 4 and can pass the latter during subsequent rotation of the frame 2.

When the cam paths 16*b* leave the bolts 15 the pins 14 on the arms 9 of the back frame will have reached the end of the slots 13' of the links 13 so that any further forward pull on the back frame 3 will cause the seat frame to turn around the studs 6, in the manner illustrated in dot and dash lines in FIG. 2.

Continued forward turning of the seat frame 2 will bring it to a position where it rests on the frame member 4, the back frame 3 being at the same time swung upwardly until it forms a prolongation of the seat frame in which position the frame 3, which at its outer end and in a manner known per se is supported by legs 17, is locked relatively to the seat frame by means of the pins 14 on the arms 9 of the back frame being held at the inner ends of the slots 13' in the links 13.

The supporting legs 17 are swingable and are adapted to be positioned as shown in FIG. 2 with the back frame in the bed position for supporting the same.

In the position shown in FIG. 2 the seat and back are disposed in horizontal juxtaposition both having their under side facing upwardly, which sides are provided with bed covers or mattresses, whereby wear and tear of the sofa covers is avoided.

In closing the bed the same movement of the different parts takes place in a reverse succession, and after the cam members 16 have been passed over the bolts 15 so that said bolts are positioned at the upper ends of the cam paths 16*a*, a final rearward swinging of the back about the bolts 15 causes a forward sliding movement to be imparted to the seat frame so that the studs 6 roll or otherwise move to the front ends of the slots 7 and the frame 2 moves across so as to rest on the frame member 4, as will be readily understood.

In order to make the seat frame and back frame easily dismountable, for instance during transport or the like of the sofa-bed, each of the slots 7 at the middle thereof are provided with an upper opening 7' communicating with a groove 18 formed in the adjacent side frame 1 and extending to the rear side thereof.

By positioning the studs 6 of the seat frame at the middle of the slots 7 the studs 6 may be passed upwards into said grooves 18 and out therethrough.

In this connection the bolts 15 are arranged to be axially movable in the side frames 1 so that they can be adjusted until the end thereof is flush with the inner side of the respective side frames so as not to obstruct a rearward movment of the back frame 3 together with the seat frame during dismantling.

In order to lock the seat frame in the bed position, the lower side of the seat frame, adjacent the front edge and at each end, is provided with an angle arm designated by numeral 21 as best seen in FIG. 5 wherein the angle arm 21 has a short leg 23 with a laterally projecting pin 23' at an end thereof pivotally supported in a bearing 20 which is secured to the frame and a longer leg 22 which extends upwardly and somewhat rearwardly as shown in FIG. 2 and which is secured, as by welding, to the pivoted end of leg 23. Leg 23 carried at its free end a locking pin 24 which is directed towards the adjacent side frame and in the position shown in FIG. 2 engages across the edges of a locking plate 25 secured to the side frame 1 to prevent the frame 2 from turning downwards by rotating around the studs 6. The end of the leg 23, carrying the locking pin 24, is connected to the longer leg 22 of the angle arm by means of a brace 26.

The angle arms at both ends of the frame 2 are interconnected by means of two or more rods or tubes 27 constituting a frame structure. The frame structure is covered with fabric 28 closing the frame and limiting the space at the under side of the sofa.

When the bed is to be converted again into a sofa the angle arms and the interconnecting frame structure 27 is swung inwardly of the seat frame 2 so as to release the locking pins 24 from the plates 25. In this position, which is seen in FIG. 1, the frame structure 27 can serve to hold bed clothes placed below the seat frame 2 while the frame structure is held in place in the sofa position by means of tie means, such as a band 29, one end of which is secured to the rear edge of the frame 2 and the other end of which can be secured to the rearward tube 27, as shown.

When the angle arms are interconnected in this manner the interconnecting frame structure projects over the bed surface of the seat frame so that said surface, after the bed has been opened, cannot be used until said frame structure 27 has been swung up, and the locking pins 24 brought into engagement with the locking plates 25. This ensures that no one can lie down on the seat frame unless it has been locked against downward swinging.

In case the necessary clearance between the side frames 1 and the frame 2 for the movement of the locking pins 24, is not available, grooves 30 shaped in accordance with the path of the pins 24 are provided in the side surface of the side frames 1.

I claim:

1. A convertible sofa bed comprising side frame elements, longitudinal front and rear support members connected to said side frame elements, a seat element resting on said support members, a back rest, means pivotally and slidably interconnecting said seat element and back rest, pivot means supporting the seat element from the side frame elements and permitting rotation and limited sliding movement of said seat element relative to said side frame elements whereby said seat element can be displaced to a position where the seat element is free from said front support member and is freely rotatable about said side frame elements, said pivot means including a plate provided with a slot on one of said elements and a pin connected to another of said elements, said pin being slidably and rotatably supported in said slot; and cam means coupling said back rest to said frame elements for controlling movement of said back rest, said cam means, upon initial movement of said back rest, causing the means interconnecting said seat element and back rest to displace said seat element to a position whereat the seat element is disengaged from said front support member so that upon further movement of the back rest the seat element is caused to be rotated about the side frame elements to a bed position, the back rest being controlled by the means connecting the back rest and seat element whereby the back rest is moved into coplanar relation with the seat element as the latter assumes the bed position whereby a substantially level extended surface is provided by said back rest and seat element in the bed position.

2. A sofa bed as claimed in claim 1 wherein the means interconnecting the seat element and back rest comprises a downwardly projecting arm on said back rest adjacent each of the side elements, a link pivotally connected to the seat element and said arm, a second link pivotally connected to the seat element and having a slot, a pin on said arm and engaged in the latter slot, said pin and slot controlling movement of said arm to permit the back rest to be moved forwardly a limited distance with respect to the seat element, the sofa bed further comprising a bolt on each of the side frame elements, said cam means engaging said bolts at the end of said limited forward movement of the back rest, said bolts constituting pivot

points about which the back rest can pivot, whereupon further movement of said back rest moves the seat element rearwardly and out of engagement with the front support member to enable pivoting of the seat element, further movement of the back rest causing pivoting of said seat element about said side frame elements.

3. A sofa bed as claimed in claim 2, in which the bolts cooperating with the cam means are axially adjustable to a position free from said cam means to enable dismantling of the sofa bed.

4. A sofa bed as claimed in claim 3, wherein the seat element has a front lower side adjacent the location where said seat element rests on the front support, the sofa bed further comprising an angle arm pivotally connected to said seat element at said front lower side, a locking pin on said angle arm, a locking plate on each side frame element for engaging the respective locking pin on the angle arms with the seat in the bed position to lock said seat therein and a frame structure constituted by rods connecting the angle arms adjacent the side frame elements together, said frame structure extending over the seat with the latter in the bed position.

5. A sofa bed as claimed in claim 4 comprising tie means detachably securing the frame structure to the seat element such that a space is defined between the frame structure and the seat element, which space is adapted for the storage of bed clothes.

References Cited in the file of this patent

UNITED STATES PATENTS

561,751	Andina	June 9, 1896
1,119,563	Arton	Dec. 1, 1914
1,330,982	Goldstein	Feb. 17, 1920
1,464,900	Brainerd	Aug. 14, 1923
1,637,797	Arton	Aug. 2, 1927
2,597,995	Jenkins	May 27, 1952

FOREIGN PATENTS

53,456	Germany	Dec. 7, 1889
13,382	Great Britain	of 1892
61,446	Denmark	Oct. 4, 1943